



ST PERSPECTIVE



SUPERIOR TECHNOLOGY

DR. WALTER BRYZIK
CHIEF SCIENTIST
U.S. ARMY TANK-AUTOMOTIVE
RESEARCH, DEVELOPMENT,
ENGINEERING CENTER
(TARDEC)



FOR A



SUPERIOR ARMY

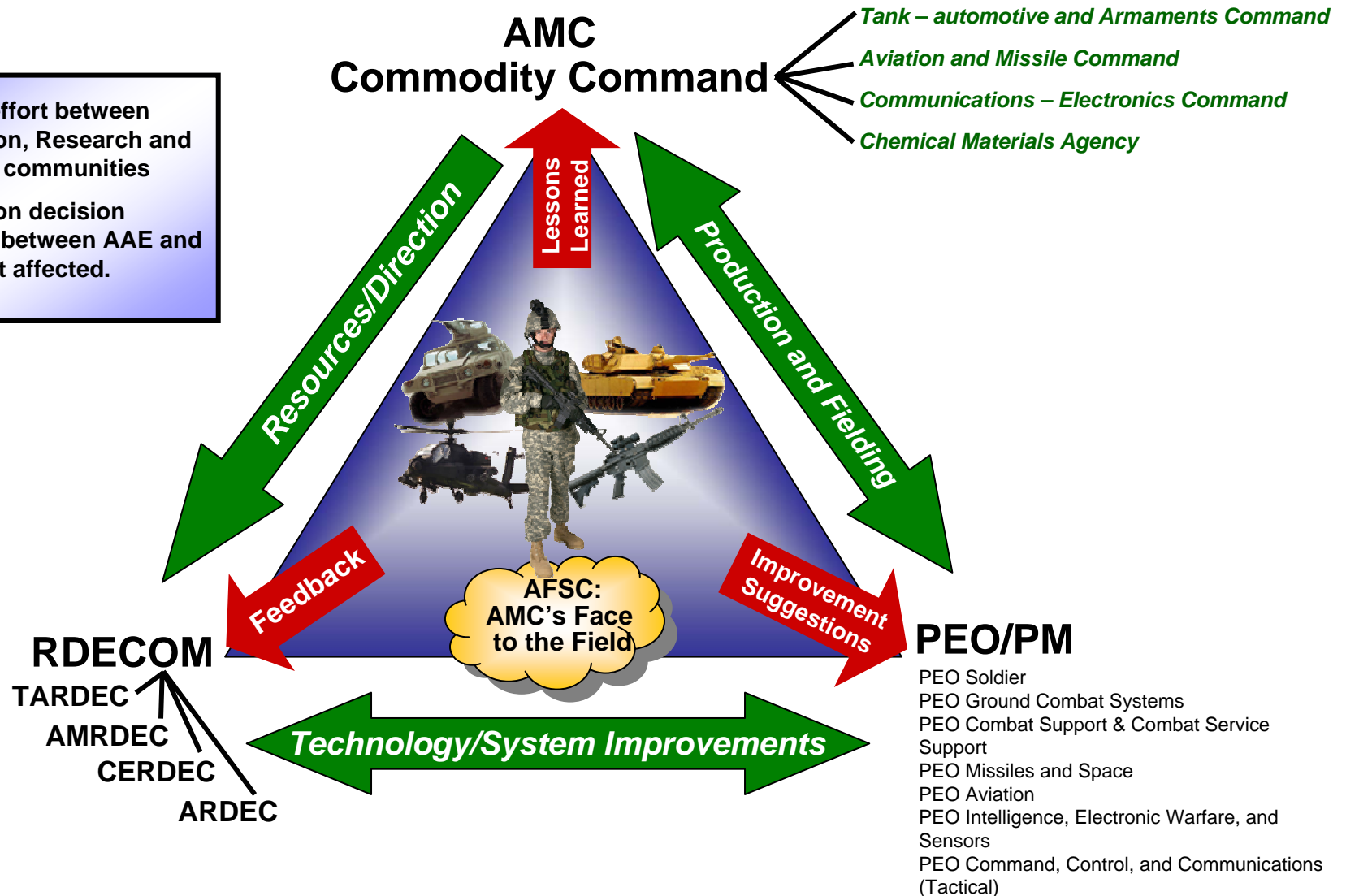


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Lifecycle Management Commands: Uniting the Effort

- Unity of effort between Acquisition, Research and Logistics communities
- Acquisition decision authority between AAE and PEO's not affected.





Army S&T Mission

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

Foster innovation and accelerate and mature technology to enable Future Force capabilities and exploit opportunities to transition technology for the Current Force



Pursuing Transformational Capabilities

Smaller, Lighter, Faster—Smarter

Current Force



~100 lb.
load

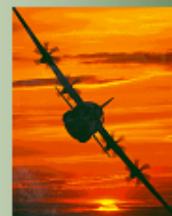


70+
tons



< 10
mph

From Platforms to
System of Systems



C-130-Like
Transportability

Future Force

< 40 lb.
effective
load



Fully networked

< 20
tons



> 40
mph



Enhancing the Current Force


SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

Benefiting from past investments

Exploiting on-going programs

Leveraging S&E expertise

Support to Current Operations
- Soldier Protection -



Interceptor Body Armor is a modular, multi-threat Body Armor using an Outer Tactical Vest (OTV) and Small Arms Protective Insert (SAPI) Plates


- **Key Technologies:** Advanced high performance fibers (e.g. Kevlar & Spectra) with lightweight ceramic-based composites for body armor and improve helmet
- **Protection:**

Weight: 15 lbs
Depth: 1.5 inches

100% rated for 100% of the edge of SAPIs embedded in OTV

Support to Current Operations
- Counter IED -

Change Detection




- System tested at Yuma on UH-1, Apache, Shadow
- 5 Units purchased and fielded by USMC

Warlock Jammers

- Family of IED Jammers
- Over 700 units fielded


Support to Current Operations
- Vehicle Protection -

Vehicle Protection - Expedient Armor
for Standard HMMWVs



- Over 9,000 HMMWV arm or survivability kits in production
- 8,888 Kits installed as of June 04

Vehicle Protection - Dry Air Bar Armor



- 820 Stryker Kits Built - 310 units for brigade deployed to Iraq, 310 units sent to Ft. Lewis
- 80 M1 Kits Built

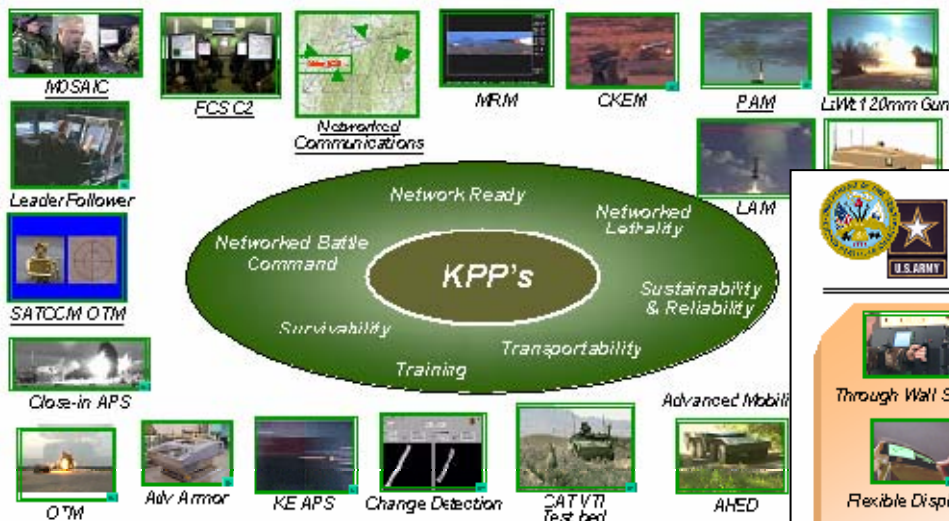


Enabling the Future Force

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY



FCS Technologies— Where we are today



Technologies for the Current & Future Force

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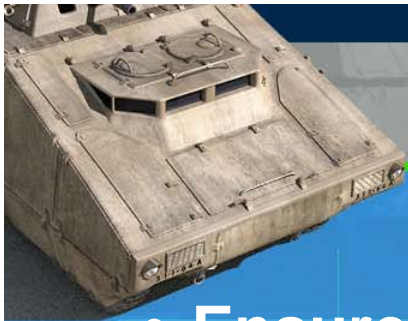
Disruptive Technologies



**Providing Strategically Responsive Forces with Information Dominance
and Paradigm Shifting Lethality & Survivability**

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Planned Goals and Objectives

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

- Ensure Army Research is
 - focused on areas that support Warfighter needs, the Army's vision and Transformation Plan
 - of high quality and technically relevant
- Maximize use of available funds
 - Attract and retain highest quality personnel
 - Support efforts to provide state-of-the-art S&T laboratories and centers
- Promote innovation and technical excellence

Provide guidance that creates a future abundant with relevant opportunities



Representative S&T Goals

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

- Maintaining / Enhancing Army S&T Budget
- Achieve Balance of Technology
 - Innovation versus Risk
- Enhanced Leveraging Through Army / Industry / Academia Partnerships





Background Army Structure

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

- Protocol / Pay Equivalent to SES
- Currently 42 Army ST Positions
(Approximately 100 STs Throughout DOD)
- Army Vision to Assure Quality Technical Talent

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ST Characteristics

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

- **WORLD CLASS EXPERTS IN A VARIETY OF TECHNICAL FIELDS**
- **PROACTIVE TECHNICAL TASKS/INPUTS (HEADQUARTERS DA/DOD)**
- **TECHNICAL S&T LEADERSHIP (ORGANIZATIONALLY)**
- **SCIENTIST MENTORSHIP / NURTURING / RECRUITMENT**
- **ACTIVE IN SPECIFIC TECHNICAL COMMUNITIES**
- **PROVIDE TECHNICAL CREDIBILITY OVER BROAD RANGE OF S&T AREAS**





Army ST Organization – Value Added

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

- **IMPROVE EFFECTIVENESS OF ARMY S&T PROGRAM**
- **IMPROVE IMAGE / RECRUITMENT OF ARMY SCIENTISTS**
- **ENHANCE TECHNICAL SKILLS OF ARMY SCIENTISTS**
- **PROVIDE RESPONSIVE TECHNICAL COUNSEL TO ARMY ADMINISTRATORS**
- **PROVIDE INDEPENDENT “IN-HOUSE” SENIOR LEVEL TECHNICAL RESOURCE (i.e. “IN-HOUSE” EQUIVALENT TO ARMY SCIENCE BOARD)**

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Opportunities for ST Participation

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- **ILIR**

- Take leading role in developing program by ensuring:
 - high technical quality of ILIR
 - projects involve high risk basic research
 - relevant to fields of investigation
 - relevant to the Army
 - money is used to attract and mentor recent graduates with new knowledge

- **BRR**

- Actively participate in evaluating, responding and implementing findings/recommendations

- **Portfolio Analysis**

- Participate as “stakeholders”
- Actively participate in implementing recommendations





Opportunities for ST Participation

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

- **Army Educational Outreach**
 - Participate in mentoring programs
 - Serve as eCybermission Ambassadors
 - Serve as Cyber Guides
- **SBIR**
 - Encourage and facilitate SBIR-ATO linkage
- **Army Science Conference**
 - Participate in shaping the conference by providing input to themes, topical discussions and invited speakers





Small Business Innovation Research (SBIR)

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

- Army SBIR Program is \$233.8M in FY05 – need to leverage these \$\$ to better support Army programs
- Increased emphasis on transition and linkage with Army Technology Objectives
- PMs/PEOs were allocated SBIR Topics this year for the first time – pilot program – need feedback
- Technology Area Chiefs' SBIR evaluations are critical





Future Reality

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

- **LIMITED ARMY S&T FUNDS**
- **CONTINUING NEED FOR STATE-OF-THE-ART QUALITY PRODUCTS**
- **NEED FOR IMPROVED PREDICTIVE TOOLS**
- **ENHANCED LEVERAGING EMPHASIS NECESSARY**
- **CRITICAL NEED TO ATTRACT TOP ARMY TECHNICAL TALENT**





What else is happening in S&T

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

- Flexible Displays Center
- Venture Capital Transition—state of charge indicator
- Future Force Warrior and Land Warrior Integration
- Joint Heavy Lift
- Hindsight II
- Network Science ITA (UK)
- Hostile Fire Indications (UK)
- S&T Program Assessments



Hostile Fire Indications (HFI)

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

Sep 04 test @ Redstone Arsenal

Small Arms, 50 cal, RPGs

Ball rounds, tracers

Data from UV CMWS and two-color IR

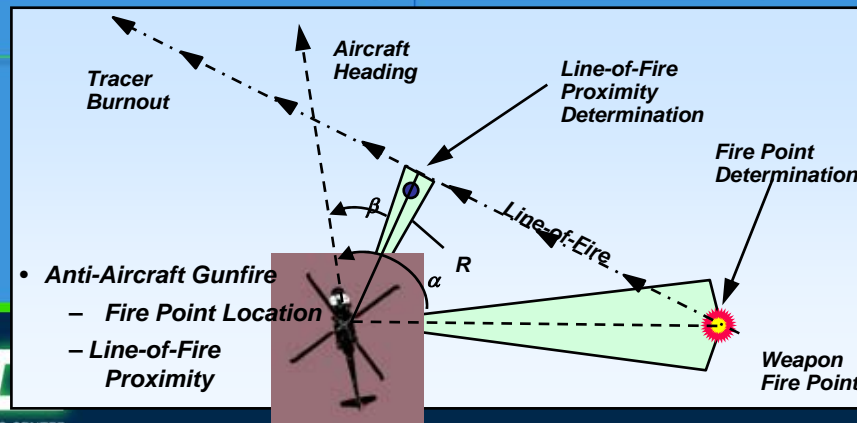
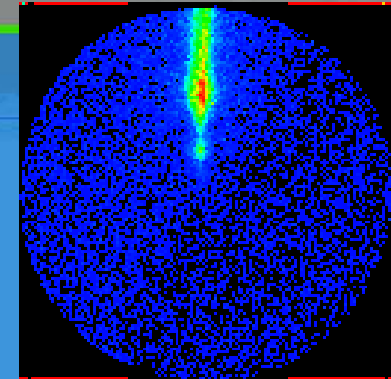
Results:

Two color IR sensor saw muzzle flashes and tracers saw everything out to maximum range

UV sensors (CMWS) saw tracers and muzzle flashes from the larger weapons (had problems seeing muzzle flashes from smaller weapons)

CMWS saw tracers from all weapons

CMWS did not see muzzle flashes at ranges greater than 500m



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What We Do

TARDEC Product Lines

TARDEC is responsible for engineering support to more than 2,800 Army systems and many of the Army's and DoD's top joint warfighter development programs:

- Combat and Tactical Vehicles
- Logistics Equipment
- Water Generation and Purification



- Fuels and Lubricants
- Military Bridging



- Fuel and Water Storage, Distribution and Quality Surveillance Equipment
- Countermine Equipment



TARDEC's Technology Thrusts

- Vehicle Survivability Systems
- Water Generation and Purification
- Unmanned Vehicle Developments
- Advanced Vehicle Concepts
- Fuel and Lubricant Research
- Crew Station Integration and Automation
- Software/Vetronics
- Next Generation Software
- Hybrid-Electric Power
- Propulsion
- Fuel Cells
- Collaborative Environments
- Physical Prototyping
- Advanced Materials
- Analytical and Physical Simulation
- High Performance Computing



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National Automotive Center (NAC)

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- In the early 1990s, the TARDEC National Automotive Center (NAC) was formed at the Detroit Arsenal to leverage the world's greatest source of automotive technology – the Metro Detroit technology might located around the Detroit Arsenal.
- Dual-use projects with automotive industry bring millions of dollars into the Detroit Metro area.
- Focus: Hope, a Detroit civil and human rights organization, through its Center for Advanced Technologies, benefits greatly through dual-use partnership projects.
- Mobile Parts Hospital (MPH)
- Advanced Collaborative Environment (ACE)
- Advanced Hybrid Electric Drive (AHED) (8x8) to Future
- J1939 Data Bus
- M113 Hybrid



Mobile Parts Hospital



ACE



AHED 8x8



J1939 Data Bus



M113 Hybrid

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DUAL NEEDS FOCUS

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TARDEC Support to Operation Iraqi Freedom/Operation Enduring Freedom (OIF/OEF)

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- TARDEC is the “point of spear” for armoring tactical vehicles in Iraq.
- TARDEC is the only tactical vehicle armoring design house in the Army.
- Designed In-House Armor Kits:
 - HMMWV
 - M939
 - M915A0/A1 Line Haul Tractor
- Integration and Rapid Prototype of Armor Survivability Kits
- Testing and recommendations of industry Survivability Kits
- Installation Training in Iraq of HMMWV Survivability Kits
- Follow-on success of Armor in Bosnia, Haiti, Somalia
- The HMMWV Armor Survivability Kit Collaboration between the U.S. Army Research Lab and TARDEC is the 2004 Collaboration Team of the Year.
- Omni-directional robot deployment for improvised explosive device detection during vehicle searches
- Over 45 TARDEC engineers deployed



Facility Excellence – Unique Infrastructure

TARDEC Labs

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

Ground Vehicle Simulation Lab



MGS Stryker on Vehicle Inertial Properties Evaluation Rig (VIPER)

Ground Vehicle Simulation Lab



Turret Motion Simulator

Physical Prototyping Lab



HMMWV – Armor Survivability Kit

Water Purification Lab



Petroleum Lab



Propulsion Lab



Test Cell 9

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Facility Excellence – Unique Infrastructure

TARDEC Labs

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

Crew Station Systems & Integration Lab



Crew Station

Ground Vehicle Simulation Lab



Ride Motion Simulator and Visualization System

Next Generation Software Lab



M1A2 System Integration Lab

Advanced Collaborative Environments (ACE) Lab



CAVE (1 of 5)
linked to Warfighter

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High Performance Computing Lab



Visual Perception Lab





TARDEC/Selfridge Air National Guard Base (SANGB) Mission Integration

SANGB is an integral part of TARDEC

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

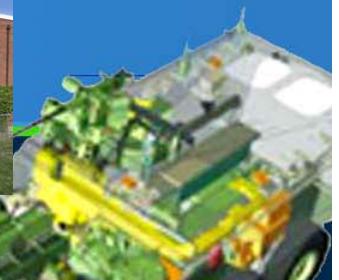
Dynamic Bridging Simulation Lab

- Capabilities include static and dynamic structural load application for structural strength and fatigue testing.
- 60'x200' facility that features a state-of-the-art computer controlled load test area with automated data acquisition capability.
- Light fabrication shop on site.



Water Lab

- Test water purification components and systems using a natural source of water.
- Test product improvements for existing military water purification systems.
- Perform basic water quality analyses.
- Introductory or refresher training for military water treatment specialists or civilians.



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Educational Outreach Summary

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

Army Educational Outreach Program is designed to identify, grow and develop future generations of Army S&Es

Implementation by MACOMS will institutionalize the process to ensure success

Success means engaging, channeling and maintaining student participation in the program throughout their academic career

Engage and channel them

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Summary

SUPERIOR TECHNOLOGY FOR A SUPERIOR ARMY

- Army S&T could be better positioned to address emerging technology trends
- Need to:
 - Increase levels of technical excellence and innovation in R & D programs
 - Increase the number of efforts working with “embryonic” technologies, while reducing the number of efforts involving “aging” and/or “mature” technologies
 - Accept greater levels of risk, commensurate with potential payoff
- Attract bright young minds to Army S &T

***Creating the future through Discovery and Innovation
for Full Spectrum Dominance***